Journal of Physics: Conference Series 2011 vol.324 N1

# EPR studies of the mechanochemically Er 3+-activated fluorite nanoparticles

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## Abstract

In the present work we show with EPR spectroscopy that the simultaneous grinding of the crystalline CaF 2 and ErF 3 salts leads to the mechanochemical doping of the single Er 3+ ions in the CaF 2 host. Dependence of the EPR spectra intensity on the grain size indicates clearly that the Er 3+ centers are created at the surface of the particles. Dominant part of the observed paramagnetic centers represent the Er 3+ ions substituting the regular quasicubic Ca 2+ lattice site (g = 6.7) perturbed by the vicinity of the surface. Fine particles of CaF 2 reveal also the nearly-isotropic EPR signal at g ~ 1.97 that originates from the surface defects and can be used for characterization of the obtained samples with respect of the average grain size. Grinding of the of the CaF 2 and ErF 3 mixture in the ratio of 100:1 during 12 hours gives the surface density of the Er 3+ ions of ~ 0.1 nm -2, or ~ 10 4 Er 3- ions per the 190-nm size particle.

http://dx.doi.org/10.1088/1742-6596/324/1/012026